

Trigger studies for KM3NeT

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- **description of the trigger requirements**
- **Performance: results based on**
 - **Trigger level for neutrino events with / without noise**
 - **Reconstructed neutrinos events with / without noise**
- **next steps / conclusion**

neutrino events

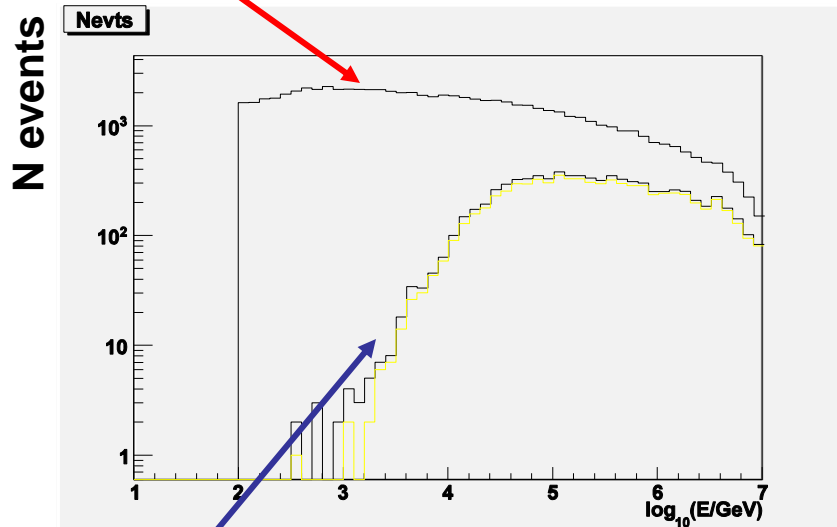
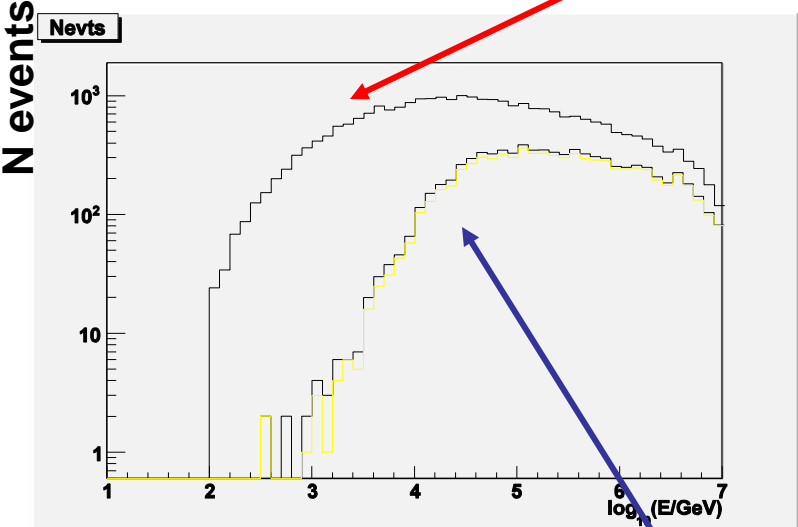
no noise

with noise

trigger level

reco level

well reconstructed events



definition of the trigger requirements

L1pm3

- take advantage of the MultiPMT OM
 - require at least 5 OMs with 2 hits correlated in space and time (neighbouring or next-to-neighbouring pmts within 20ns)
 - require at least N OMs with 3 hits correlated in space and time (neighbouring or next-to-neighbouring pmts within 20ns)

N = 5



31 x 3" PMTs

definition of the trigger requirements

- **require clusters of hits**

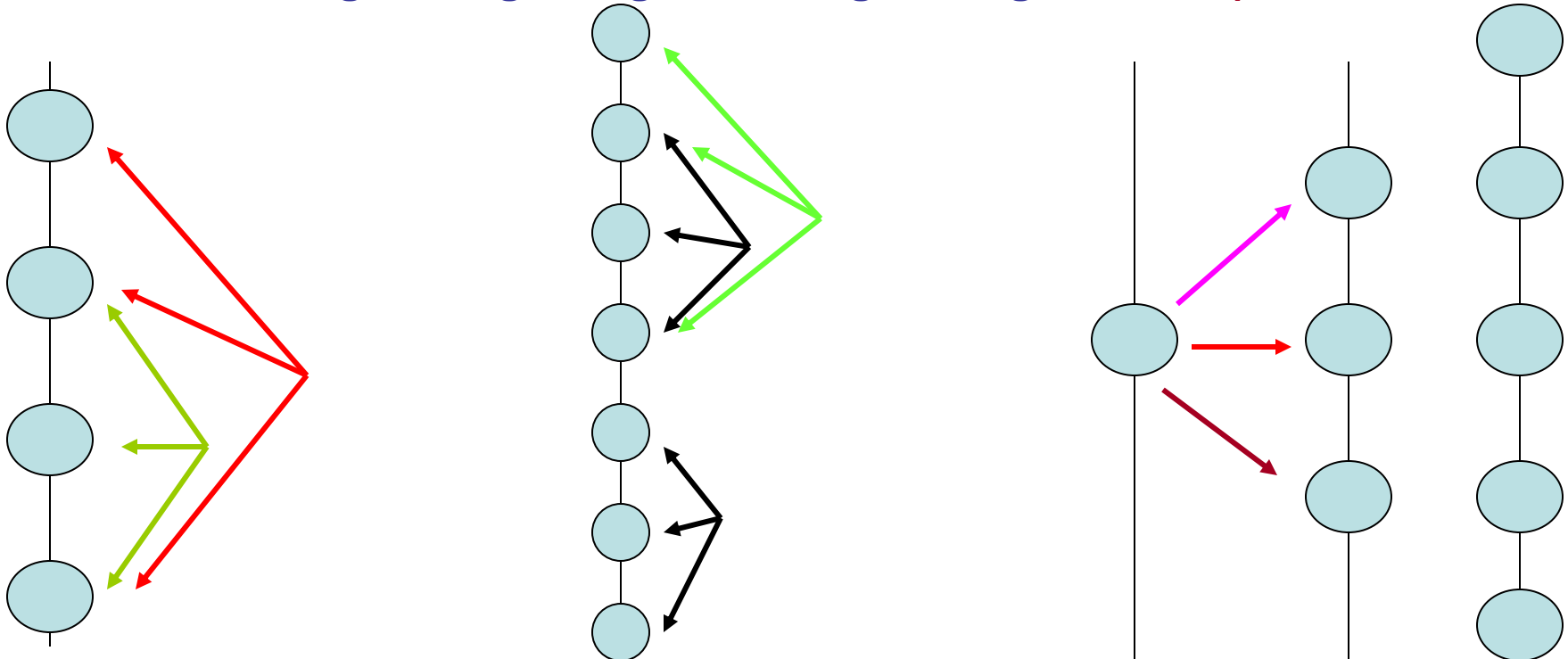
L2

apply new filtering algorithms

- **at least 3 clusters of 3 OMs or 4 clusters of 2 OMs**

- **at least 2 clusters of 3 OMs on the same string (vertical tracks)**

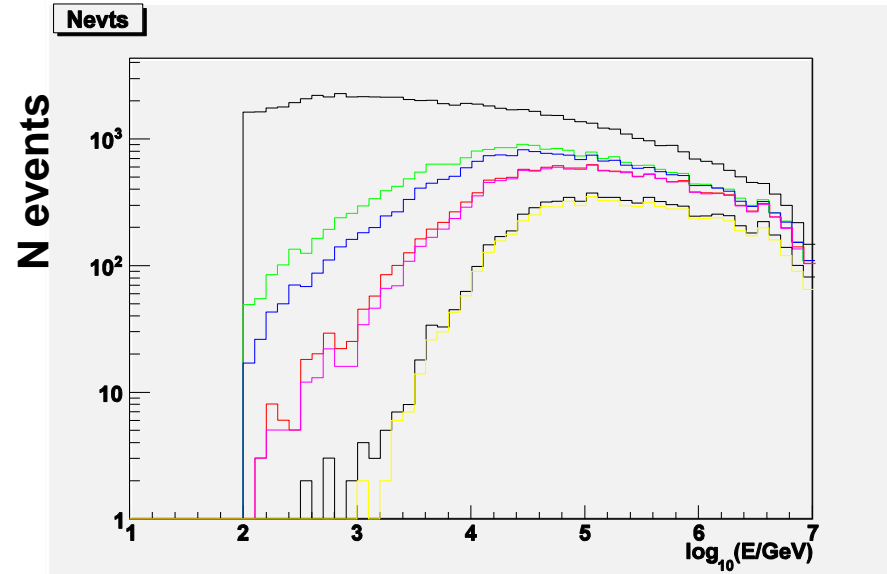
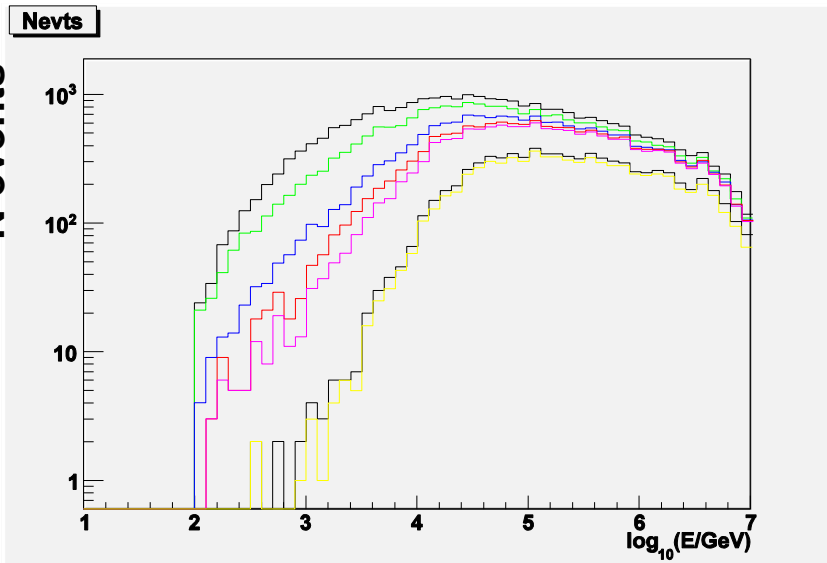
- **cluster of neighbouring strings with neighbouring OMs hit (horizontal tracks)**



trigger studies: neutrino events

no noise

with noise



L1

2T3

L2

L1pm3

L1pm3L2

trigger level

all reconstructed events

reco level

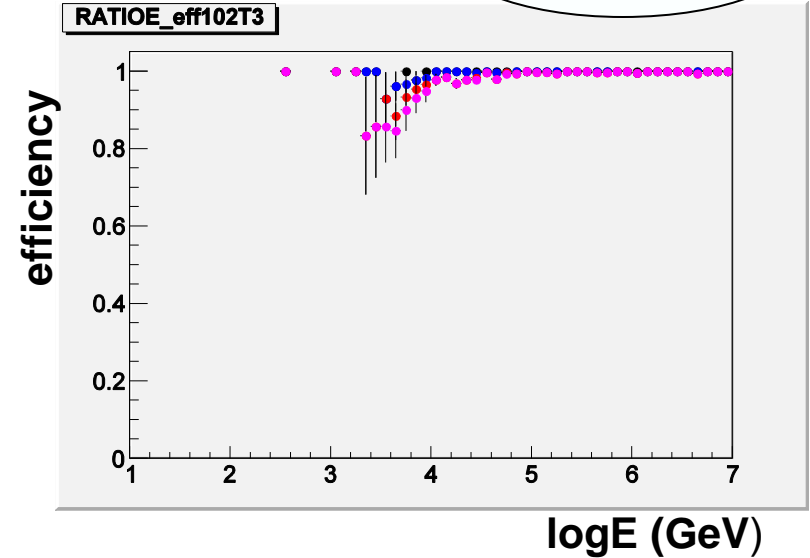
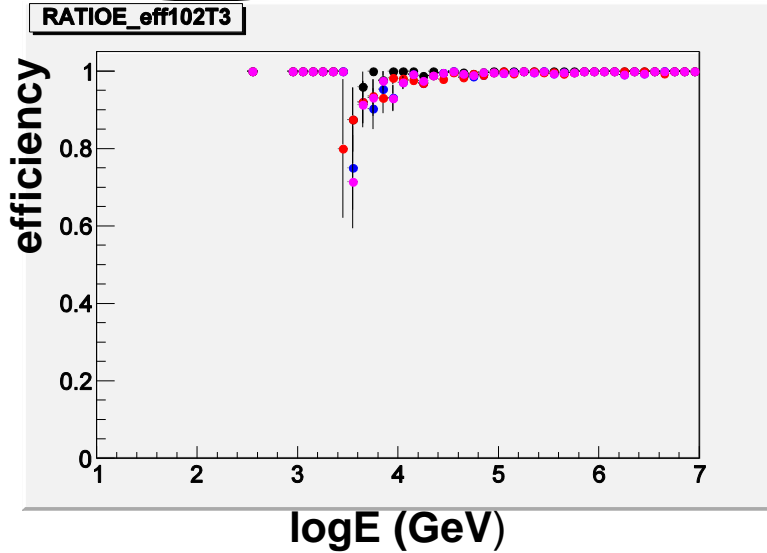
well reconstructed events

trigger studies: neutrino events

no noise

efficiency

with noise



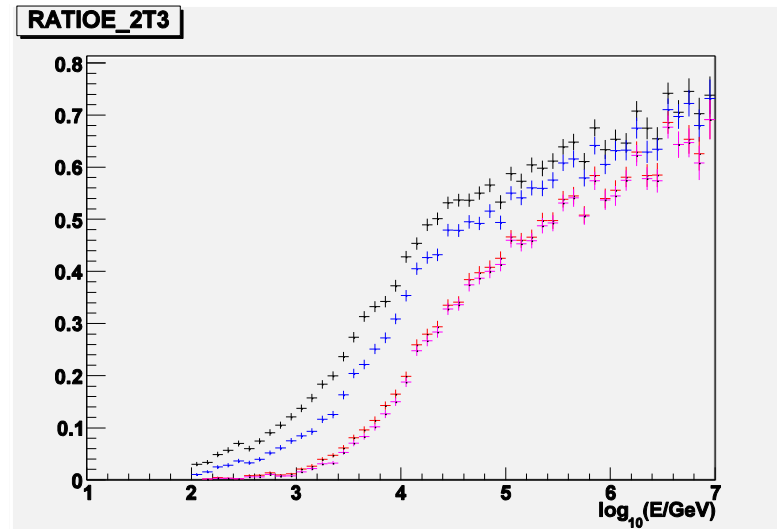
2T3

L2

L1pm3

L1pm3L2

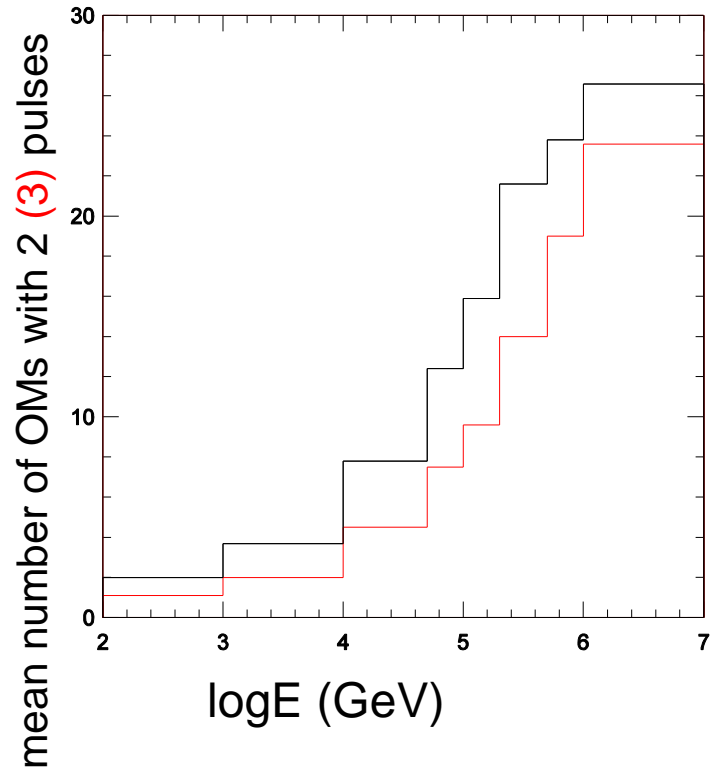
ratio of triggered events



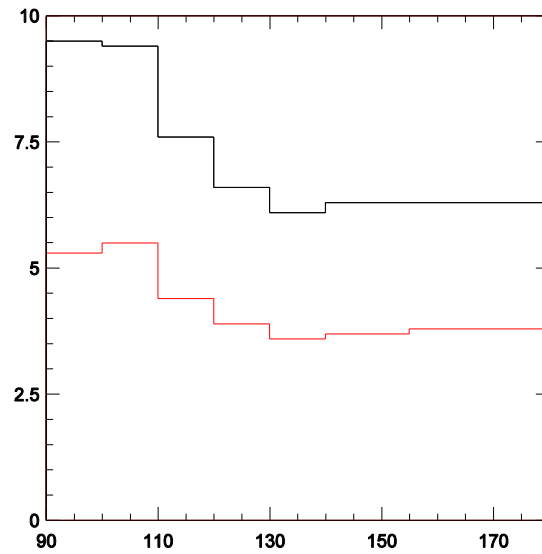
conclusion

- Trigger optimization studies:
 - very efficient filtering at the trigger level 2
 - large suppression of noise contribution
 - high efficiency for well reconstructed events

backup



Emu 10-50TeV



Emu 50-100TeV

